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JAY P. HENDRICKSON

Attorney at Law

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April 3, 2003

Mr. Scott Roberts Kalkman
P.O. Box 1905
Healdsburg, CA 95448

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

Re: U.S. Application No. 10/057,209
Filing Date: January 22, 2002
Title: **Submersible Marine Vehicle**
Inventors: Dunn, Adam Peter, et al.

Dear Mr. Kalkman:

You should recall that I am the attorney who prepared and filed the above-referenced patent application for the Submersible Marine Vehicle invention, generally referred to as the "Swimmy" invention. At the time I prepared the application I was a partner with the law firm of Foley & Lardner. I have recently left Foley & Lardner and I am now in private practice. During the course of the application preparation process, I was informed that you were one of the joint inventors of the invention.

Due to your status as a joint inventor, I request that you sign and date the enclosed "Declaration for Utility or Design Patent Application" and the "Power of Attorney or Authorization of Agent". The Declaration provides, in part, that you are one of the original and first inventors of the Swimmy invention and that you have reviewed and understand the application papers. In that regard, I have enclosed with this letter a complete copy of the Swimmy patent application, comprising the Cover page, Specification (pages 2 through 14), Claims (pages 15 through 19), Abstract (page 20), and five (5) figures (FIG. 1, FIG. 2, FIG. 3, FIG. 4, and FIG. 5). The Power of Attorney generally authorizes me to prosecute the Swimmy patent application on your behalf, and to transact all business in the United States Patent & Trademark Office in connection with the patent application.

After you have signed and dated the Declaration and Power of Attorney, please send the original signed documents back to me in the self-addressed envelope. **Please be advised that I must receive the signed documents from you within ten (10) days after you**

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Sincerely,

A handwritten signature in black ink, appearing to be "Jay P. Hendrickson". The signature is written over the printed name.

Jay P. Hendrickson

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J. Hendrickson
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ato, CA 94949

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐Declaration
Submitted
with Initial
Filing

OR

☒Declaration
Submitted after Initial
Filing (surcharge
(37 CFR 1.16 (e))
required)

Attorney Docket Number

First Named Inventor

Adam Peter Dunn

COMPLETE IF KNOWN

Application Number

10/057,209

Filing Date

01/22/2002

Art Unit

Examiner Name

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Submersible Marine Vehicle

(Title of the Invention)

the specification of which

☐

is attached hereto

OR

☒

was filed on (MM/DD/YYYY)

01/22/2002

as United States Application Number or PCT International

Application Number

10/057,209

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
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Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

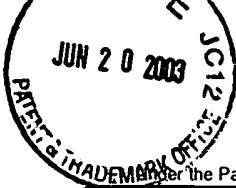
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.							
NAME OF SOLE OR FIRST INVENTOR :				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Adam Peter				Dunn			
Given Name (first and middle [if any])				Family Name or Surname			
Inventor's Signature						Date	
Sebastopol				California		United States	
Residence: City				State		Country	
U.S.A.				Citizenship			
Mailing Address 117 Morris Street							
Sebastopol				California		95472	
City				State		ZIP	
U.S.A.				Country			
NAME OF SECOND INVENTOR:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Scott Roberts				Kalkman			
Given Name (first and middle [if any])				Family Name or Surname			
Inventor's Signature						Date	
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Residence: City				State		Country	
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Mailing Address P.O. BOX 1905							
Healdsburg				California		95448	
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DECLARATION**ADDITIONAL INVENTOR(S)**
Supplemental Sheet
Page ____ of ____

Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name Gary		Family Name or Surname Starr	
Inventor's Signature Sebastopol		Date U.S.A.	
Residence: City 117 Morris Street	State California	Country United States	Citizenship U.S.A.
Mailing Address			
Mailing Address			
City Sebastopol	State California	ZIP 95472	Country United States
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name James R.		Family Name or Surname Jeremias	
Inventor's Signature Sebastopol		Date U.S.A.	
Residence: City	State California	Country United States	Citizenship U.S.A.
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Mailing Address			
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Application Number	10/057,209
Filing Date	January 22, 2002
First Named Inventor	Adam Peter Dunn
Title	Submersible Marine
Group Art Unit	Vehicle
Examiner Name	
Attorney Docket Number	

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I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

SIGNATURE of Applicant or Assignee of Record

Name

Scott Roberts Kalkman

Signature

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

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Atty. Dkt. No.: 059284-0146

U.S. PATENT APPLICATION
FOR
SUBMERSIBLE MARINE VEHICLE

Inventors: Adam Peter Dunn
Scott Roberts Kalkman
Gary Starr
James R. Jeremias

Express Mail mailing label no.: ET461519395US

Date of Deposit: January 22, 2002

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January 22, 2002

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Submersible Marine Vehicle

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to the technical field of submersible marine vehicles.

BACKGROUND OF THE INVENTION

[0002] Submersible marine vehicles which are designed to be operated by a swimmer or diver at underwater depths of several hundred feet are now well known in the art. Two notable examples are disclosed in U.S. Patent Nos. 5,423,278 and 5,634,423, both issued to Lashman. Each of these inventions generally includes a submersible marine vessel, operable both upon and beneath the water. Each vessel includes a water-tight hull elongated along a longitudinal axis corresponding to an intended direction of travel. The hull also has a pair of lateral hand gripping means or handles, and a velocity control switch is operably associated with each handle. A battery, disposed with the fluid-tight hull, provides power to a motor/propeller assembly. The motor/propeller assembly is generally disposed within a protective shroud which is integral with and extends downwardly from the underside of the hull.

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[0003] Recreational versions of the above patents exhibit similar designs. For example, in U.S. Patent No. 5,105,753 issued to Chih, et al., comprises a water-tight main body or hull containing a battery, but the motor/propeller assembly is disposed within a shroud which is behind and in axial alignment with the hull.

[0004] These prior art marine vehicle designs have several limitations, especially when the designs are applied to recreational users who are not well trained in the safe operation of a marine vehicle. A significant limitation is that the propeller is positioned such that the operator's fingers or hand may come in contact with the rotating propeller, causing severe bodily injury. Another limitation is that the designs are, in general, bulky in that the propeller compartment is separated from the water-tight hull.

[0005] The present invention provides a marine vehicle for recreational use which overcomes the limitations described above and provides several other advantages.

SUMMARY OF THE INVENTION

[0006] The present invention generally includes a submersible marine vehicle for recreational use in which a propeller and motor assembly is disposed within the vehicle's hull and a battery is disposed beneath the hull.

More specifically, the front end of the hull contains a plurality of inlets and the back end contains a plurality of outlets. However, the inlets and outlets are not large enough to permit a user's hand or fingers to come into contact with the propeller. The propeller and motor assembly is disposed within, rather than below, the hull such the propeller is adjacent to the hull's front end and the motor is adjacent to the hull's back end. The propeller has at least one propeller blade, with the blade having a leading edge aft of a trailing edge.

[0007] The hull also includes a pair of fins which are integral with the hull, each fin extending horizontally and away from the hull. Each fin contains a hand hold, extending downwardly and away from the underside surface of the fin. A pair of curved tracking fins are attached to opposite sides of the bottom side of the hull, each curved tracking fin extending outwardly and downwardly away from the hull.

[0008] A water-tight housing, attached to the bottom of the hull, contains two compartments: one compartment holds a battery which powers the propeller and motor assembly, and which provides ballast to the vehicle, and the other compartment contains buoyant material in order to provide buoyancy to the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention is illustrated by reference to the following figures:

[0010] FIG. 1 is a front perspective view of the submersible vehicle.

[0011] FIG. 2 is a front view of the submersible vehicle.

[0012] FIG. 3 is a back view of the submersible vehicle.

[0013] FIG. 4 is a top view of the submersible vehicle, showing cross-section line A-A.

[0014] FIG. 5 is a cross-sectional view of the submersible vehicle along line A-A.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring generally to FIG. 1 and FIG. 2, the present invention is a submersible marine vehicle 1 comprising a bullet-shaped hull 2, approximately symmetrical about a horizontal hull axis, with the hull 2 having a rounded front end 3 section, a cylindrical center 4 section and, a circular opening 5 at a back end. The hull has a cylindrically shaped inside surface 21 and rounded front end inside surface 22, which define a hull cavity 20. The shape of the hull cavity 20 is illustrated in FIG. 5.

[0016] A solid horizontal member 6, which is integral with the hull, extends in a horizontal plane outwardly from the hull 2 and forms a pair of horizontal fins 7 and 8 which are joined at the hull's rounded front end 3 section and which extend back and widen towards the circular opening 5 at the hull's back end. The solid horizontal member 6 separates a top half of the hull 2 from an approximately symmetrical bottom half of the hull 2. The solid horizontal member 6, in addition to forming a pair of horizontal fins 7 and 8, has a pair of hand holds 9 and 10, with each hand hold being integral with and extending vertically downward from the underside of its respective fin. A carrying hand hold 11 is defined by an opening through the horizontal member 6, adjacent to the rounded front end 3 section of the hull 2.

[0017] Two (2) approximately parallel and horizontal top inlet slots 12 define openings through the rounded front end 3 section, within the top half of the hull 2, and seven (7) approximately parallel, vertical and equally spaced bottom inlet slots 13 similarly define openings through the hull's rounded front end 3 section, within the bottom half of the hull. Two (2) of the bottom inlet slots 13 comprise end slots, with the other five (5) bottom inlet slots 13 positioned between the two end slots. Six (6) inlet portholes 14 define openings through the hull's rounded front end 3 section, within the bottom half of the hull 2. Three (3) of the inlet portholes 14, which are

approximately vertically aligned, evenly spaced, and substantially similar, are located adjacent to one of the end slots, and the other three (3) inlet portholes 14, which are also approximately vertically aligned, evenly spaced and substantially similar, are located adjacent to the other end slot. The axis of each inlet porthole 14 is approximately parallel to the hull axis. The inlet slots and inlet portholes are provided in order to permit water to flow through the hull's rounded front end 3 section and into the hull cavity 20.

[0018] A pair of curved, symmetrical tracking fins 27 and 28 are disposed under the hull, and top portions of the tracking fins are joined together to form a circumferentially curved fin plate 29 which is mated to and attached to the hull's bottom half. Each curved tracking fin extends outwardly and downwardly from the hull's bottom half. An elongated, rectangularly shaped and water-tight housing 30 with a rounded front-end is centrally disposed between the pair of tracking fins 27 and 28. The housing's top side is circumferentially curved and is mated and attached to the circumferentially curved fin plate 29. The pair of symmetrical tracking fins 27 and 28 and housing 30 are each aligned under the hull's bottom half such that the tracking fins and housing are symmetrical around the same vertical plane, which is also co-extensive with the hull axis.

[0019] In a preferred embodiment, the hull **2**, pair of horizontal fins **7** and **8**, pair of hand holds **9** and **10**, and pair of tracking fins **27** and **28** are made of high density polyethylene.

[0020] Referring to FIG. **3**, a circularly shaped back-end cover plate **15** is disposed within the hull's circular opening **5** and is attached to the hull **2** by means of a plurality of clamps (not shown). The back-end cover plate **15** contains four approximately parallel, horizontal, and equally spaced end cover plate outlet slots **16**. The outlet slots **16** are provided to permit the water that has entered the hull cavity **20** through the inlet slots and inlet portholes to exit the hull cavity **20**.

[0021] Referring to FIG.'s **4** and **5**, a propeller and motor assembly **17**, having a propeller **18** and a motor **19**, is disposed within the hull cavity **20**, such that both the axis of the propeller and the axis of the motor, which are in axial alignment, are approximately collinear with the hull axis.

[0022] The propeller **18**, having three propeller blades, is positioned adjacent to the hull's rounded front-end inside surface **22**, and the motor **19** is positioned adjacent to the back-end cover plate **15**. The propeller and motor assembly **17** is secured in its position within the hull's cavity **20** by means of a vertical support member **23** attached at its top end to the underside of the assembly **17** and at its opposite end to the bottom of the

hull's cylindrically shaped inside surface **21**. The propeller blades are configured within the assembly **17** such that the leading edge of each propeller blade is aft of the trailing edge. Thus, as water flows through the inlet slots **12** and **13** and inlet portholes **14**, and into the hull cavity **20**, the water first contacts the propeller blade's trailing edge. Although this propeller configuration is less efficient in crating an initial pressure differential access the propeller, the configuration has the advantage of reducing the initial acceleration of the vehicle, which is much safer and easier to operate by recreational users.

[0023] Adjacent to the hull's cylindrically shaped inside surface **21** and surrounding the propeller and motor assembly **17** is a solid, but light weight, elongated encasement **24** which depends radially from the hull's inside surface **21** and defines an elongated and rectangularly shaped encasement cavity **25** surrounding the assembly **17**. Preferably, the encasement **24** is made of high density, plastic coated form. The front end of the elongated encasement **24** tapers to the hull's cylindrically shaped inside surface **21**, forming a tapered encasement **26** section, and the back end of the elongated encasement **24** terminates approximately at the circular opening **5** at the hull's back end. The propeller and motor assembly **17** is positioned within

the encasement cavity 25 such that the propeller is approximately adjacent to the tapered encasement 26 section.

[0024] The interior portion of the housing 30 contains a battery 32 which is positioned in a ballast compartment 31 towards the back of the housing 30, and the front portion of the housing contains a buoyant compartment, filled with polystyrene plastic, or some other light weight buoyant material. The battery 32 supplies electrical power to the propeller and motor assembly 17, which is activated by means of a magnetically controlled toggle switch 34 (e.g., "reed" switch), which extends outwardly from either the right or left side of the bottom half of the hull and adjacent to a vertical hand hold.

[0025] In operation, when the submersible marine vehicle is placed in the water, the water-tight housing 30, including the buoyant compartment 33 and ballast compartment 31, acts to both vertically align the vehicle and provide sufficient buoyancy, such that the vehicle floats approximately level, with either a zero or slight positive angle of attack above the water level. In this position the water level covers the top horizontal inlet slot, but does not completely cover the top half of the hull. A user positions himself or herself behind the back-end plate, grips the two hand holds, and points the hull's front end 3 section in the direction of travel. Simultaneously, the propeller and motor assembly 17 is activated by operating the toggle switch 34. As

the user pushes the vehicle forward through the water, the rotating propeller 18 creates a pressure differential across the propeller 18 and water begins to flow through the inlet slots 12 and 13 and portholes 14, towards the hull's back-end cover plate 15 and through the outlet slots 16. The force with which the water exits the outlet slots 16 creates an equal and opposite force on the vehicle, propelling the vehicle in a forward direction along the surface of the water. The vehicle is also readily submerged by simply pointing the hull's front end 3 section in a downward, underwater direction.

[0026] Several novel features of the present invention combine to produce a submersible marine vehicle which is significantly improved over previous designs. The primary improvement is that the present invention encloses the propeller and motor assembly inside of the vehicle's hull, rather than outside of the hull. This design significantly improves the safety of the vehicle since the user's hand and fingers, and other extremities, cannot come into contact with the propeller. The design also causes the marine vehicle to be pulled through the water, rather than pushed, as in propeller's designed for other marine vehicles. This pulling action, combined with the location of the propeller, provides a substantial benefit to the user due to reduced strain on the user's wrist and arms. Further, the propeller is disposed within the hull cavity such that each propeller blade's leading edge is aft of the trailing edge

rather than having a more traditional configuration with the trailing edge aft of the leading edge. Although the traditional propeller configuration is more efficient in creating a substantial pressure differential across the propeller's plane of rotation, the configuration has the disadvantage of potentially causing the vehicle to start moving suddenly and abruptly. The propeller configuration of the present invention, however, does not create the same substantial pressure differential when it first starts rotating. This feature of the present invention is utilized so that, upon activation of the propeller, the vehicle is not powered by the propeller until the user has pushed it forward a sufficient distance to fill the hull's cavity with water. As the cavity fills, the efficiency of the propeller increases, until it reaches its operational efficiency. Finally, the efficiency of the propeller is enhanced by the addition of the tapered section of the encasement surrounding the propeller. This tapered section causes an increase in the velocity of the water as it enters the propeller's plane of rotation, and this increase in water velocity increases the pressure differential across the propellers, which in turn increases the exit velocity of the water through the outlet slots, and which in turn increases the velocity of the vehicle.

[0027] The utility and efficiency of the present invention are further enhanced due to other novel features. The two horizontal inlet slots on the

hull's front end are positioned such that when the user turns the vehicle, water continues to flow uniformly through the hull cavity. If the slots were replaced with portholes, the portholes would not provide a continuous flow of water to the hull's cavity. The vertical inlet portholes located on the bottom of the hull assist in maintaining a uniform flow of water through the hull before passing through the outlet slots. The pair of curved fins and housing provide for enhanced tracking and stability, as compared to the stability provided by single or dual fins. Further, the housing functions as a keel, and provides ballast and buoyancy to the vehicle.

[0028] Another feature of the present invention is that the vehicle is self-righting in that no matter how the unit is placed in the water, it will always float to the surface and right itself. This functionality is due to the unique motor-over-battery design in which the vertical plane of symmetry of the battery is co-extensive with the axis of the hull and the axis of the propeller and motor assembly. An additional feature of having the battery below and outside of the vessel's hull is that the battery can be easily and quickly changed.

[0029] Another important feature of the present invention is the design of the circular end plate. Although the design of the end plate, as described above, contains four rows of outlet slots, several other configurations are

possible. For example, if the hull's interior encasement formed a cylindrical shape around the propeller and motor assembly, rather than a rectangular shape, the outlet slots could be replaced with portholes arranged in a circle. Further, the end plate may be provided with an adjustable means, permitting the user to partially cover or uncover the outlets, and in this manner modify the volume of water exiting through the outlets. By adjusting the size and location of the outlet openings, the user may alter the velocity, acceleration and maneuverability of the vehicle.

[0030] While the present invention has been described with reference to a few embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications may occur to those skilled in the art without departing from the scope of the invention as defined by the appended claims.



CLAIMS

WHAT IS CLAIMED IS:

- 1 1. A submersible vehicle comprising:
 - 2 a) a hull having a front end, back end, top side, bottom side,
 - 3 outside surface and inside surface, said inside surface defining a hull
 - 4 cavity;
 - 5 b) a plurality of inlets contained within the front end of the
 - 6 hull, whereby the inlets allow water or other liquid to flow into the hull
 - 7 cavity;
 - 8 c) a plurality of outlets contained within the back end of the
 - 9 hull, whereby the outlets allow water or other liquid to flow out of the
 - 10 hull cavity;
 - 11 d) a propeller and motor assembly disposed within the hull
 - 12 cavity, said propeller having at least one propeller blade having a
 - 13 leading edge and a trailing edge;
 - 14 e) a housing attached to the bottom side of the hull, said
 - 15 housing containing a front compartment and a back compartment, said

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16 front compartment containing a buoyant material and said back
17 compartment containing an energy source used to power the motor;

18 f) a pair of fins integral with and extending horizontally
19 away from said hull;

20 g) a pair of hand holds integral with the bottom surface of
21 said pair of fins; and

22 h) a pair of tracking fins attached to opposite sides of the
23 bottom side of the hull, each tracking fin extending outwardly and
24 downwardly away from the hull.

1 2. The submersible vehicle of claim 1 in which the plurality of
2 inlets includes two approximately horizontal and parallel top inlet slots
3 located within the top side of the hull.

1 3. The submersible vehicle of claim 1 in which the plurality of
2 inlets includes seven approximately vertical and parallel bottom inlet slots
3 located within the bottom side of the hull.

1 4. The submersible vehicle of claim 1 in which the plurality of
2 inlets includes six inlet portholes located within the bottom side of the hull,
3 wherein three of the portholes, located on one side of the hull, are

4 approximately vertically aligned and evenly spaced, and the other three
5 portholes, located on the other side of the hull, are approximately vertically
6 aligned and evenly spaced.

1 5. The submersible vehicle of claim 1 in which the plurality of
2 outlets comprises four approximately horizontal and parallel back outlet slots.

1 6. The submersible vehicle of claim 1 in which the front end of the
2 hull has a rounded bullet shape.

1 7. The submersible vehicle of claim 1 in which the back end of the
2 hull comprises a circularly shaped opening, with a circularly shaped disk
3 disposed within the opening, said disk containing the plurality of outlets.

1 8. The submersible vehicle of claim 7 in which the plurality of
2 outlets comprises four approximately horizontal and parallel back outlet slots.

1 9. The submersible vehicle of claim 1 in which the propeller and
2 motor assembly is disposed within the hull cavity such that the propeller is
3 adjacent to the hull's front end and the motor is adjacent to the hull's back
4 end.

1 10. The submersible vehicle of claim 9 in which the leading edge of
2 the at least one propeller blade is adjacent to the motor and the trailing edge

3 of the at least one propeller blade is adjacent to the hull's front end, whereby
4 the propeller blade's leading edge is aft of the trailing edge.

1 11. The submersible vehicle of claim 1 in which the hull is
2 approximately symmetrical about a horizontal hull axis.

1 12. The submersible vehicle of claim 11 in which the propeller axis
2 and motor axis are in axial alignment and are approximately colinear with the
3 hull axis.

1 13. The submersible vehicle of claim 12 in which an elongated
2 encasement having a front and back end, depends radially from the hull's
3 inside surface, said encasement defining a rectangularly shaped encasement
4 cavity surrounding the propeller and motor assembly.

1 14. The submersible vehicle of claim 13 in which the front end of
2 the encasement tapers from the encasement cavity to the inside surface of
3 the hull, forming an encasement tapered section.

1 15. The submersible vehicle of claim 14 in which the propeller is
2 adjacent to said encasement tapered section.

1 16. The submersible vehicle of claim 1 in which the housing's
2 energy source is a battery in electrical connection with the motor.



1 17. The submersible vehicle of claim 1 in which the buoyant
2 material is polystyrene plastic.

1 18. The submersible vehicle of claim 1 in which the hull is made of
2 high density polyethylene.

1 19. The submersible vehicle of claim 13 in which the elongated
2 encasement is made of high density plastic coated foam.



ABSTRACT

The present invention generally includes a submersible marine vehicle for recreational use in which a propeller and motor assembly is disposed within the vehicle's hull and a battery is disposed beneath the hull. The front
5 end of the hull contains a plurality of inlets and the back end contains a plurality of outlets. The propeller and motor assembly is disposed within the hull such the propeller is adjacent to the hull's front end and the motor is adjacent to the hull's back end. Each propeller blade has its leading edge aft of its trailing edge. The hull includes a pair of fins which are integral with
10 the hull, each fin extending horizontally and away from the hull. Each fin contains a hand hold, extending downwardly and away from the underside surface of the fin. A pair of curved tracking fins are attached to opposite sides of the bottom side of the hull, each curved tracking fin extending outwardly and downwardly away from the hull. A water-tight housing,
15 attached to the bottom of the hull, contains two compartments: one compartment holds a battery which powers the propeller and motor assembly, and which provides ballast to the vehicle, and the other compartment contains buoyant material in order to provide buoyancy to the vehicle.

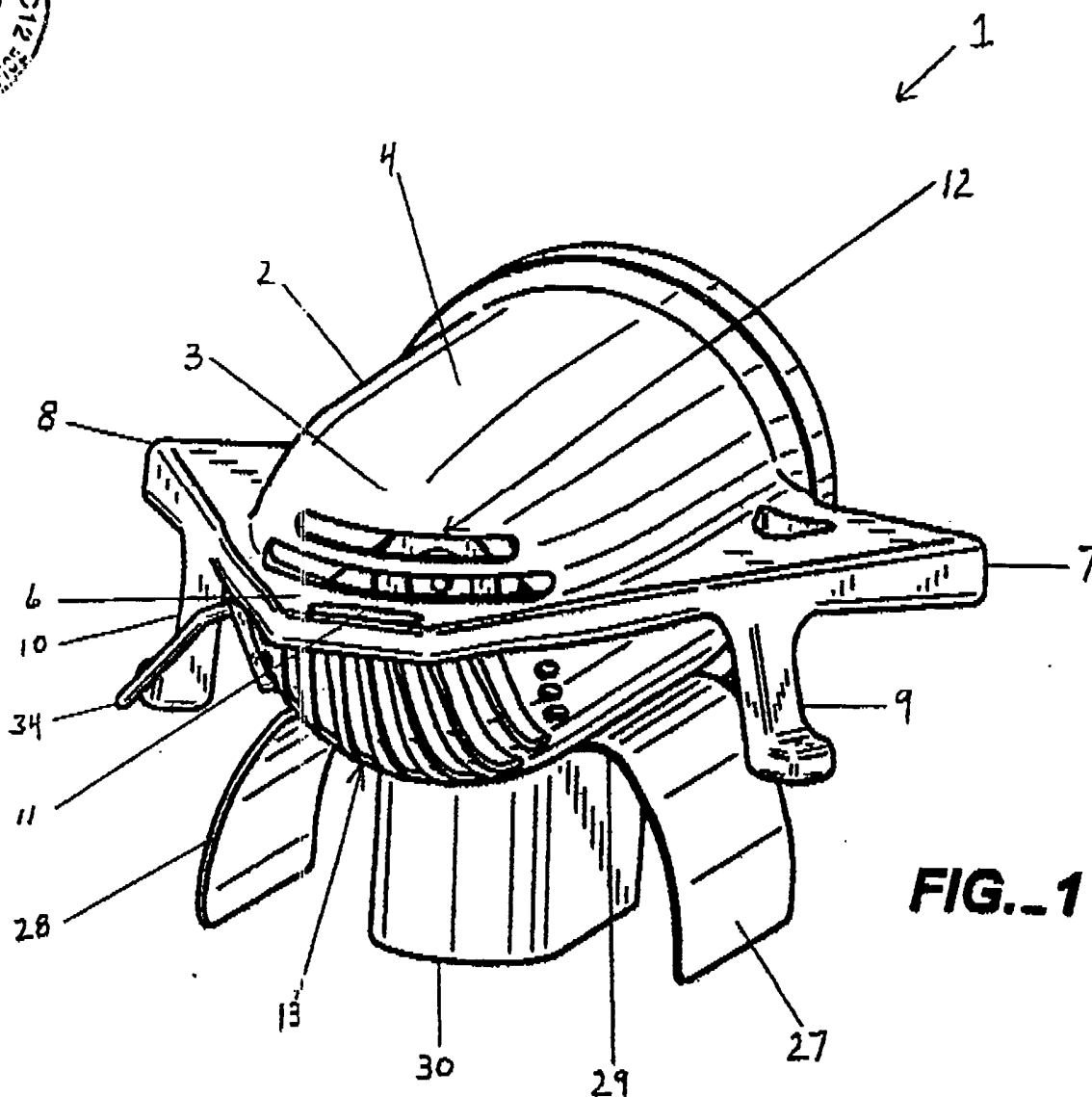


FIG. 1

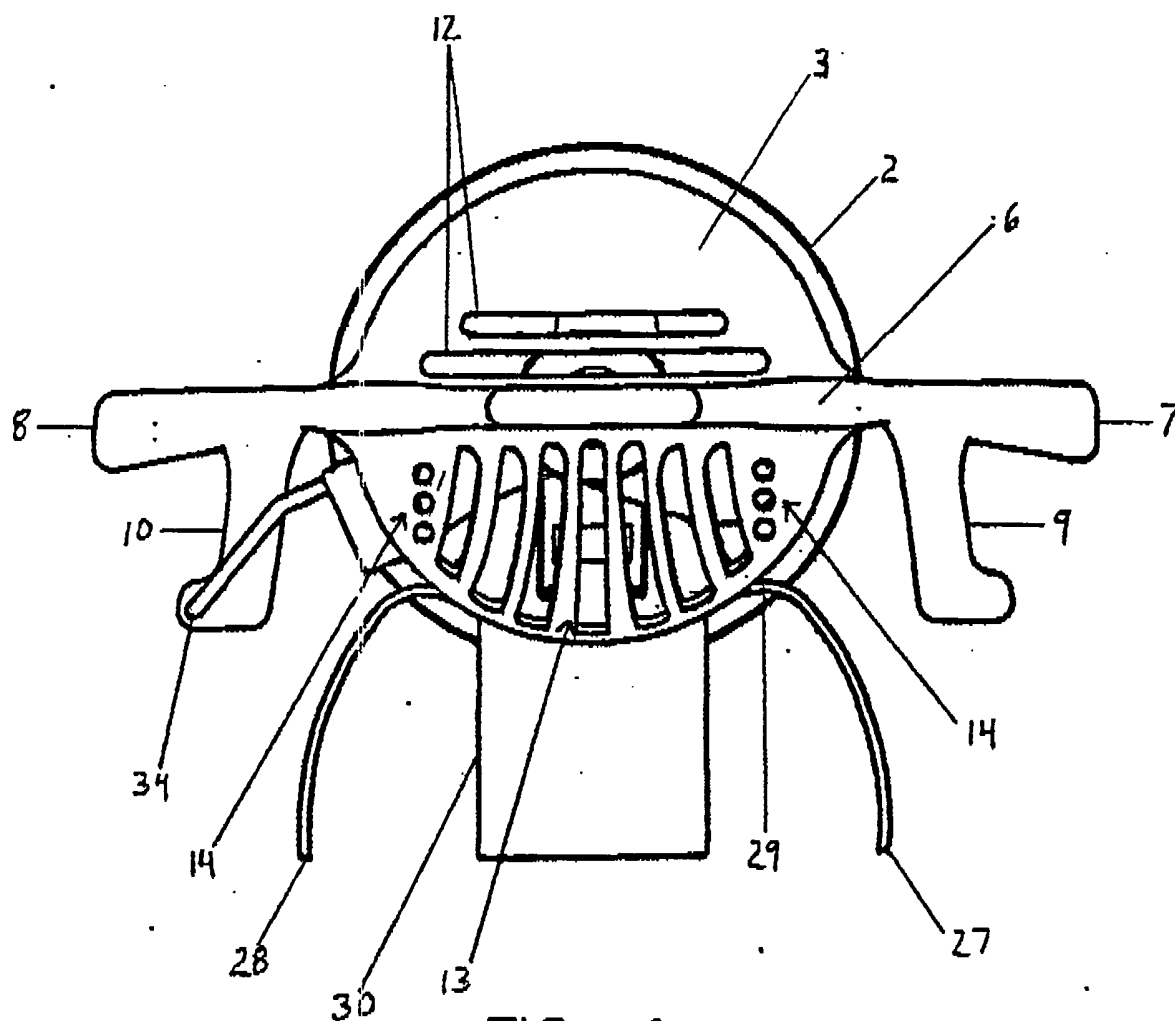


FIG. 2

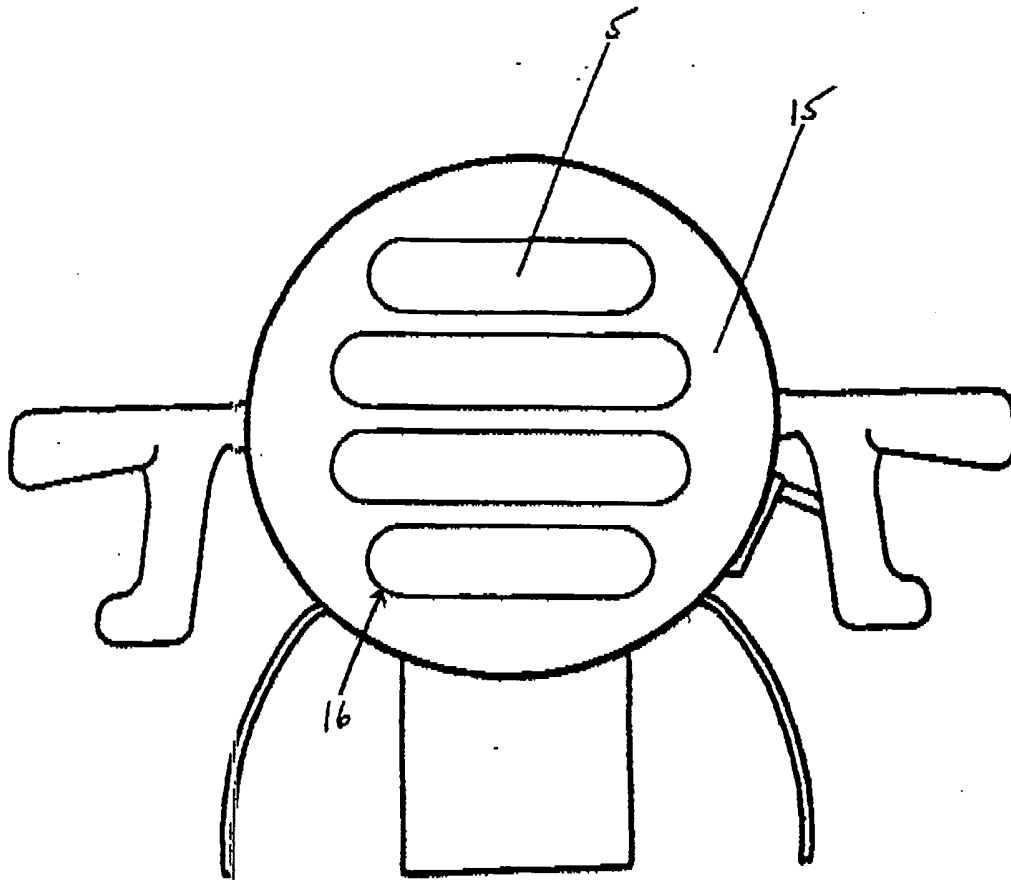


FIG. 3

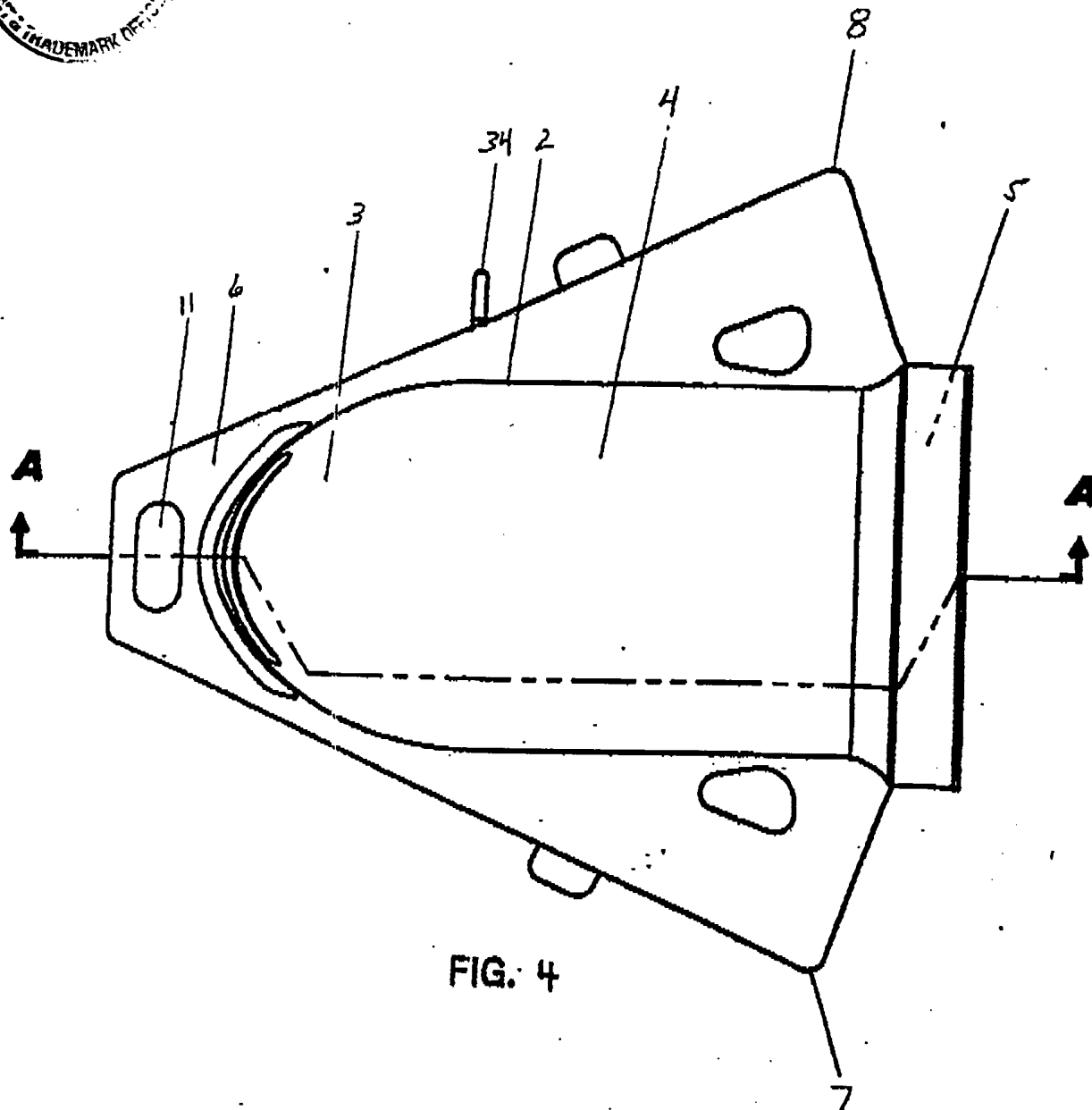
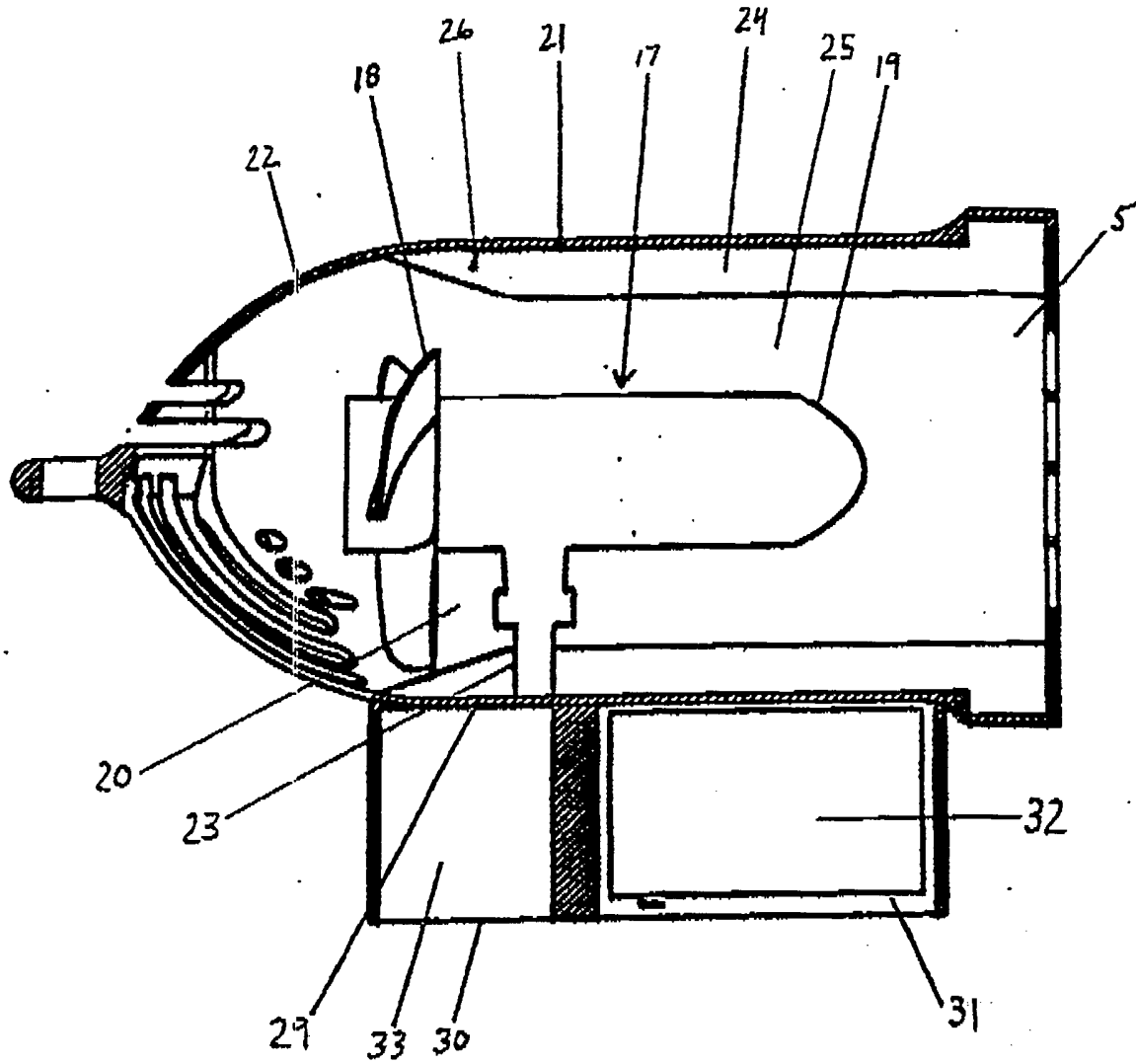


FIG. 4



SECTION A-A

FIG. 5